Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

ORIGINAL

In the Matter of	)	
Amendment of the Commission's Rules to Establish New Personal Communications Services	)	GEN Docket No. 90-314, RM-7140, RM-7175, RM-7618

Request for Waiver

Northern Telecom Inc. hereby requests that the Commission waive the 10 page limit on replies to comments on petitions for reconsideration set forth in Section 1.429(g) of the Commission's Rules, and accept Northern Telecom's enclosed consolidated reply comments. Numerous parties had filed comments with respect to the more than sixty reconsideration petitions, making it impossible to respond in a single pleading within the 10 page limit. The alternative, of filing numerous individual responses, would be a waste of Northern Telecom's and the Commission's resources.

Given the importance of the Commission's PCS rulemaking, Northern Telecom believes that the public interest will best be served if the PCS Rules are carefully reexamined, and such a review will require a full, concise and accurate

record. Therefore, Northern Telecom believes that good cause exists for a waiver of the page limit on reply comments.

Respectfully submitted,

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Dated: January 13, 1994

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REPLY COMMENTS ON THE PETITIONS FOR RECONSIDERATION

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SUMMARY

Northern Telecom filed a petition for reconsideration seeking an increase in the maximum power for licensed PCS base stations, and modifications to the unlicensed PCS rules to incorporate several provisions of the WINForum Spectrum Etiquette that had not been reflected in the rules. The vast majority of commenters agree with Northern Telecom's proposals to modify the rules. Thus, Northern Telecom continues to urge the Commission to amend its rules as suggested in its reconsideration petition.

No valid basis for retaining or lowering the power limit was advanced, and even the point-to-point incumbents did not object to an increase. Northern Telecom also requests that the Commission reject proposals that it become entangled in the standards setting process, since such involvement by the FCC is likely to delay standards setting and the deployment of PCS.

Northern Telecom urges the Commission to extend the formula for low-power exclusion to the PCS bands, because otherwise the lack of adequate facilities for SAR testing may become a bottleneck. Northern Telecom also requests that the Commission reexamine the build-out rules, since waivers or a flexible interpretation could allow the deployment of innovative, low-power services in niche markets.

With respect to the unlicensed PCS issues, Northern Telecom believes that no valid reasons have been proffered that would support denial of the Northern Telecom reconsideration petition, or that would support any additional changes to the rules. The Commission should not alter the spectrum allocation

to assign the 1910-1930 MHz band to asynchronous devices, nor should the Commission eliminate the 1.25 MHz channelization. The Commission should, however, eliminate the packing rule. Finally, as supported by other parties, the Commission should modify its rules to conform with the WINForum Spectrum Etiquette for marker channels and multi-carrier devices.

Northern Telecom believes that the record now establishes that the public interest would best be served by adopting these various proposals suggested by Northern Telecom.

Table of Contents

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REPLY COMMENTS ON THE PETITIONS FOR RECONSIDERATION

Northern Telecom Inc. ("Northern Telecom") hereby replies to several of the comments on the petitions for reconsideration filed with respect to the decision establishing service rules for Personal Communications Services ("PCS").[1/] Northern Telecom had filed a petition for reconsideration seeking an increase in the maximum power for licensed PCS base stations to at least 1000 watts, and modifications to the unlicensed PCS rules to incorporate several provisions of the WINForum Spectrum Etiquette that had not been reflected in the rules. While the vast majority of commenters agree with Northern Telecom's proposals, there are a few issues that Northern Telecom will comment on in these replies.

1/ Amendment of the Commission's Rules to Establish Personal Communications Services, GEN Docket No. 90-314, FCC 93-451, released October 22, 1993 ("PCS Order").

Increase in Base Station Power Limits

Northern Telecom advocated an increase in the base station power limits to 1600 watts EIRP in order to ensure economical deployment of PCS, and to allow the use of innovative new technologies.[2/] Moreover, as demonstrated by studies analyzing the Washington, D.C. BTA, an increase in the power limit will not cause any significant increase in potential interference to the incumbent users, and may even decrease the number of paths affected. Numerous parties in their comments on the reconsideration petitions echoed Northern Telecom's request for an increase in the base station power limits.[3/] Indeed, even the filers representing the incumbent users did not object to an increase in the power limit.[4/]

Two commenters did object to an increase in the power limits. Nextel urged the Commission to reject the requests for an increase in power, but failed to address the basis for the

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2/ Northern Telecom Petition at pp. 4-22; Northern Telecom Comments at pp. 3-6.

3/ E.g., MCI; GTE; Telocator; General Communication, Inc.; Citizens Utility Company; George E. Murray.

4/ E.g., American Association of Railroads at p. 6; Utilities Telecommunications Council at p. 15; American Petroleum Institute at p. 4; Alcatel Network Systems at p. 4; Fixed Point-to-Point Section of the Network Equipment Division of TIA at p. 7. To the extent that these commenters conditioned their non-opposition on the application of interference/coordination criteria, Northern Telecom agrees that the Commission's rules for coordination/protection should reflect the increase in power. Northern Telecom further observes that the decrease in the number of base stations required to provide service will offset the increase in power, as demonstrated in the studies performed by MLJ.

change put forth by Northern Telecom: (i) PCS cannot be economically deployed strictly as a low-power, microcellular service if the coverage requirements are to be met; (ii) an increase in power will allow innovative technologies to be deployed; (iii) an increase in power is necessary to allow competition to cellular and the ESMR services offered by Nextel.

Apple, in commenting on the requests to increase the power limit for base stations, sought to further restrict the power limits (to 2 watts) on base stations in the 5 MHz on either side of the unlicensed PCS bands in order to protect the unlicensed devices from interference. Northern Telecom agrees with Apple that the Commission must craft rules to protect unlicensed PCS devices from licensed PCS emissions. Indeed, Northern Telecom is intending to market products for both licensed and unlicensed PCS, and thus has carefully evaluated the potential interference issues. However, the solution suggested by Apple does not balance the needs of both services, and so should be rejected.

Northern Telecom believes that the technical solution it has posited in its petition for reconsideration and comments will allow the coexistence of low-power unlicensed PCS and high-power licensed PCS. Northern Telecom has suggested the extension of the out-of-band power requirements to any frequency outside a licensed block to prevent any licensed or unlicensed PCS operator from interference emissions generated by any counterpart, as well

as proposing measurement standards.[5/] A similar solution was suggested by Telocator.

The Apple suggestion of severely limiting the power in certain licensed PCS spectrum would render it difficult to offer viable service. Thus, Northern Telecom urges the Commission to adopt the higher power limits and its concomitant proposed rule changes for interservice interference, and deny the request of Apple to further restrict the base station power limits.

Mandated Standards

In its comments on the petitions for reconsideration, Northern Telecom urged the Commission to reject the requests of petitioners to require compliance with ANSI-accredited standards as a prerequisite to type approval.[6/] Although Northern Telecom strongly supports and contributes to a voluntary, industry-driven process, such a requirement would entangle the Commission in the standards setting process and slow standards development and the deployment of PCS. Other parties commenting on the reconsideration petitions agree with Northern Telecom on this issue.[7/]

Other commenters did support the call for mandated standards. Those commenters, however, provide no valid basis for the requested Commission involvement in the standards setting

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5/ Northern Telecom Petition at pp. 25, B-7, B-8; Northern Telecom Comments at pp. 9-10.

6/ See Northern Telecom Comments at pp. 6-9.

7/ E.g., MCI at pp. 21-22.

process, which Northern Telecom maintains should be a voluntary, industry-driven procedure. Requiring compliance with ANSI-accredited standards would unduly complicate and delay the adoption of industry-developed standards, which in turn would threaten the timely deployment of PCS. Thus, the request for tying type approval to compliance with ANSI-accredited standards, while probably well-intentioned, would ultimately disserve the public interest.

RF Health Hazards

In the Notice, the Commission indicated that it would apply the updated IEEE standards on an interim basis, pending the resolution of the issues on a broader basis in Docket No. 93-62. As Northern Telecom pointed out in its petition for reconsideration, such a course could retard the deployment of PCS if the low-power exclusions were not extended to the 2 GHz band, since there were very limited facilities for SAR testing presently available. The IEEE has now written to the Commission to indicate that the Commission can conservatively extrapolate the low-power exclusion formula into the 2 GHz band without creating adverse health risks.[8/]

Northern Telecom urges the Commission, as part of its interim prescription of RF standards, to allow manufacturers to rely on the IEEE formula extrapolated to the 2 GHz band in lieu

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8/ Letter from Eleanor R. Adair, Co-Chairman Subcommittee 4, to Thomas Stanley, dated October 11, 1993, and placed into the file in Docket No. 93-62 on November 16, 1993.

of SAR testing. While Northern Telecom believes that these limits may be too conservative and that possibly less stringent limits will be adopted in Docket No. 93-62,[9/] as a temporary measure such limits will allow PCS products to be deployed. The alternative -- requiring SAR testing -- could create a bottleneck because of the absence of testing facilities.[10/] Northern Telecom thus urges the Commission to amend the Rules to specify the low-power exclusion from the extrapolated IEEE formula pending the issuance of final rules in Docket No. 93-62.

Build-Out Requirements

Northern Telecom observes that the comments contain views on whether the build-out rules should be changed, proposals to split license territories, and the difficulty for many licensees to comply with the wide area service rules and still respond to the current niche, low-power services.[11/] Northern Telecom believes that it is essential to increase the base station power limit to allow economic deployment of PCS, particularly in rural areas. In addition, however, there are

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9/ Cf., "Biological Effects and Exposure Criteria for Radiofrequency Electromagnetic Fields," NCRP Report No. 86, 1986 (advocated by EPA as a better standard), which suggests a less stringent far-field limit at 2 GHz as opposed to lower frequencies.

10/ There are currently only two laboratories in this country capable of SAR testing, one associated with the University of Utah and the other owned by a manufacturer.

11/ E.g., Southwestern Bell; BellSouth; Pacific Bell/Nevada Bell; National Telephone Cooperative Association; OPASTCO; NYNEX; Alliance of Rural Area Telephone and Cellular Service Providers.

some licensed PCS applications that would best be served through low-power systems, such as wireless loop, in-building voice and data, localized campus coverage for schools, hospitals, universities and large businesses, or isolated communities.

Northern Telecom recommends that the Commission seek to accommodate both prompt high-power wide area PCS coverage and the early deployment of new, innovative low-power PCS services. The Commission's build-out rules require prompt deployment of PCS to the general population, including Rural America, and a 1600 watts EIRP base station power limit will make wide area coverage practical. PCS should also promptly provide unserved niche needs that typically use spectrally efficient low-power systems. The Commission could encourage prompt deployment of niche, low-power PCS services, without changing the build-out requirements rule by further defining what constitutes "service to the population," and by issuing specific guidance on when it is likely to grant waivers of the rule.

Northern Telecom believes that the Commission will need to grant some waivers of the build-out rule,[12/] and that other waivers may serve the public interest. The Commission should also consider how "service to a percentage of the population" is defined as an additional means of flexibly applying the rule. For example, many niche services will provide coverage for rural residents at their place of employment and/or where they shop,

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12/ E.g., under the rule, the build-out requirements are based on the percentage of service to population numbers that existed during the 1990 Census. Some PCS territories may have lost more than 10% of the 1990 population, thus rendering it impossible to comply with the 90% build-out requirement.

but not at their homes. In addition, a licensee could be permitted to meet its service obligations through resale of PCS capacity of others or other similar arrangements, thereby delaying the need to construct its own facilities throughout the territory.[13/] Northern Telecom believes that, particularly in the early years of PCS when unencumbered spectrum will be a problem for all licensees, the Commission should liberally define what constitutes "service to the population" so as to support such economic deployment.

Northern Telecom anticipates that licensees may seek waivers of the build-out rule, especially entrepreneurial operators seeking to serve BTA territories and difficult to serve MTA territories. The Commission could encourage such entrepreneurial operators to participate in the PCS license auctions and facilitate early network planning by publishing guidance as to what parameters will be considered adequate justification for a waiver from the build-out rules.

It may be very well be impractical, even with high base station power, for all licensees in an area to achieve both the build-out rules and accommodate genuine niche PCS needs. Therefore, to achieve the social goals for PCS, to provide new innovative services, and to provide wide coverage, some waivers

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13/ Licensees are authorized to "consolidate" licenses, but it is unclear whether the Commission will permit joint service agreements to better share the burden of wide area coverage and to permit some licensees to focus on niche service needs. MTA and BTA licensees serving common geographic areas should be authorized to meet their build-out requirements by entering into joint service agreements that would provide the population with wide coverage, niche services and healthy competition.

will be prudent. However, absent advance guidance from the Commission, many of the entrepreneurs that might be able to provide these innovative services would be reluctant to participate in the license auctions.

Northern Telecom believes that the combination of a broad definition of service to the public, and a willingness to grant waivers when appropriate (as set forth in guidelines issued in advance) should provide a level playing field for all licensees and all territories. In setting such regulatory ground rules, however, the Commission should not merely permit "cream skimming" by letting some licensees provide service only to prime high density populations while mandating wide area build-out from the other PCS licensees. In sum, Northern Telecom believes the Commission can maintain strong build-out requirements and facilitate early deployment of niche low-power services by liberally defining what constitutes service, and by issuing further guidance as to when waivers will be favorably considered.

Allocation -- Contiguous 20 MHz

Several of the comments reiterate support for a reassignment of the unlicensed PCS spectrum so that the 1910-1930 MHz band is used solely for asynchronous transmissions.[14/] Those commenters are correct in that strictly as a matter of engineering, 20 MHz of contiguous spectrum is generally more useful than two segments of 10 MHz. However, as Northern Telecom

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14/ E.g., Ericsson Corporation.

has previously explained, that analysis ignores the practical necessity of funding the removal of incumbents that will permit both asynchronous and isochronous devices to operate.[15/] If the proponents of the contiguous spectrum for isochronous devices are able to present a credible plan for promptly and fairly funding the relocation of the incumbents, then Northern Telecom could support the change in spectrum allocation to two contiguous 20 MHz segments. Because they have not been able to do so to date, Northern Telecom continues to oppose such a reassignment.

One Second/30 Second Time-Out

In its comments, Ericsson suggests that instead of incorporating the marker function within the bearer time-frequency combination as suggested by the FCC, the rules should reinstate the marker provision as outlined in the WINForum Etiquette with the 30 second response requirement. Northern Telecom finds this approach acceptable. In fact, either the current FCC rule (Section 15.321(c)(4)) modified with the change to a 30 second time-out, or the Ericsson proposal, would be acceptable. As between the two approaches, Northern Telecom somewhat prefers the WINForum wording, since that language had been discussed and accepted by industry members.

15/ See, e.g., Northern Telecom Comments on the Apple Emergency Petition, November 8, 1993 at pp. 6-8.

Packing Rule

Ericsson is correct that as a general proposition, there is a low probability of collision on normal call set-up.[16/] However, there remains a need to eliminate the packing rule (Section 15.321(b)), because in the case of call set-ups due to hand-offs necessitated by interference (a likely situation with data and licensed PCS adjacent), there may be many calls which will need to be reconnected -- all starting at the same time. This "deadly embrace" scenario has been discussed extensively at WINForum and was one of the reasons why the provision was dropped from the Spectrum Etiquette. Northern Telecom's market trials have shown conclusively that dropped calls, which can result from the "deadly embrace," are not acceptable in the business environment.

The alternative packing rule suggested by some, which requires starting 2-3 MHz from an edge of the band to avoid increased interference to the incumbents, results in only 7-8 MHz being available, and does not resolve the "deadly embrace" problem. Northern Telecom thus reaffirms its recommendation of dropping the packing rule entirely.

Channelization

One issue that has already been addressed exhaustively has been raised again in the comments, where parties are advocating elimination of the Commission's use of 1.25 MHz

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16/ Ericsson at pp. 10-12.

channels for unlicensed PCS recommended by WINForum.[17/] No new information has been provided by the proponents for removing the 1.25 MHz channelization. The same arguments that were presented at the WINForum deliberations and in earlier pleadings, and previously rejected, are being raised yet again.

During industry discussions, Northern Telecom expressed concern with regard to two problems with removing or changing the channelization:

1. In the absence of channelization, no workable mechanism has been proposed to ensure that different systems from different manufacturers would be able to "fit" together. As a result, spectrum would be used inefficiently, and consumers would be denied access to unlicensed PCS, because of wasted spectrum resulting from carrier spacing and widths that would not interleave between dissimilar systems. This difficulty will be encountered in industrial condominiums, office buildings, commercial malls, etc. Thus, calls for eliminating the channelization scheme should be rejected.

2. If there is an absence of channelization (and given the limited amount of spectrum), no viable mechanism has been suggested to ensure that one system does not monopolize the available spectrum. Under the proposal suggested by some commenters, a 5 MHz device would locate the carrier 2-3 MHz from one isochronous boundary. Since the related proposed packing rules would require the search to start 2-3 MHz from the other edge, there would be only the 2-3 MHz at the edge for other potential PCS users located in the same building.

In light of these two major problems and the arguments presented in its earlier pleadings, Northern Telecom continues to urge the Commission to reject the petitions advocating removal of the 1.25 MHz channelization.

17/ E.g., Ericsson; Apple.

Multi-Carrier Devices

In its petition for reconsideration, Northern Telecom requested that the FCC reinstate the WINForum Spectrum Etiquette provision that enabled multi-carrier devices to access the spectrum. In the comments, several companies opposed that portion of the Northern Telecom petition on the grounds that this would violate the listen-before-talk ("LBT") provision. This argument is a misinterpretation of Northern Telecom's intent. The WINForum provision advocated by Northern Telecom would not violate the LBT rule, but would allow an alternative means of compliance that will provide an equal measure of protection to other systems from interference. This alternative means of access is essential in order to provide the benefits of PCS to all segments of American business. A detailed explanation of the interference protection incorporated in the proposed rule is set forth in the technical attachment hereto.

CONCLUSION

In its petition for reconsideration, Northern Telecom suggests some critical changes, including an increase in the power limit for licensed PCS base stations and modification of the unlicensed PCS rules to reflect more closely the WINForum Spectrum Etiquette. Several of these issues were addressed by the parties commenting on the numerous petitions for reconsideration filed on December 30, 1993. As detailed above, those comments do not provide any valid basis for rejecting

Northern Telecom's request for relief. By taking the actions proposed by Northern Telecom, the Commission will create rules for PCS that best serve the public interest.

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Attachment

The LBT Mechanism

Summary and outline

-> LBT is a fundamental concept in spectrum sharing intended to reduce the probability of interference between unrelated systems using the same frequency band.

-> The critical parameter determining reliability of detection between two systems is the overlap between the listening interval of the candidate device and the transmission interval of the active device(s).

-> Because of the drifting in time (up to 1 msec. every 50 seconds), due to oscillator stability limits, of the time windows of the unrelated systems, the overlap between the two systems will change relatively rapidly.

-> Thus, just because listening indicates a time-frequency window is "quiet" does not mean that that window is not being used.

-> Because of this drifting, the choice of the listening interval (transmit or recieve) is not a factor in the probability of detecting an active device.

-> Including the WINForum provision for multi-carrier devices in the rules as recommended by Northern Telecom does not change the interference potential, but enables many benefits of PCS for American business. One example of such benefit is cost-effective combined voice and data systems.

The Listen Before Transmit (Talk) Mechanism

Several commentors have stressed the importance of the listen before talk (LBT) concept in the sharing of spectrum in the PCS unlicensed bands. This concept was embodied in the WINTech filings with the FCC and the Part 15 rules outlined in the second report and order. The basic concept is that devices should (must) listen to the radio environment to check that no other device is using the channel (time/spectrum window) before beginning transmissions. If another device's transmissions are heard above a threshold, then the new device must either wait until the channel is clear or select another channel. This is intended to enable devices from many different systems to access and share the spectrum in an equitable and dynamic manner and to minimize the probability of interference between different systems which have no communication between them.

Limitations of the LBT Mechanism

During the discussions of the LBT concept it was realized that there were a number of conditions in which the LBT would not guarantee non-interference. It was also realized that there would be practical conditions which would constrain the listening ability of devices.

The LBT mechanism does not guarantee non-interference in a number of cases. One of these is when the coverage areas of two dissimilar systems overlap. This is sometimes referred to as the "near-far" problem and it will be discussed later. This condition of interference is made more probable by the drifting of the timing windows between the dissimilar systems.

In the LBT process devices must monitor the channel BEFORE they begin transmissions and from this information infer what the activity on the channel will be in the future and whether the new transmissions will affect any existing users. The probability of interference to another device therefore depends on the accuracy with which the current and future activity on a channel can be predicted from a past measurement.

For the asynchronous devices, the limited length of the transmissions set by section 15.323 (f) improves the ability of a device to infer future activity on a channel. For the isochronous devices, regular periodic transmission patterns are expected and these allow some prediction of future channel activity based on past measurements. As there are many ways to arrange regular combinations of transmit and receive intervals, however, limited

measurements cannot always reliably predict the actual time/spectrum window usage.

A key element of the functioning of the LBT process to protect against inter system interference is thus the ability of devices to make a measurement of the channel at one instant of time and the probability of that measurement successfully predicting the activity on the channel at future times. In the WINTech filing and in the SRO, this timing is provided by sections 15.321 (e) which sets a frame interval quantization and the required accuracy for the system timing. In a departure from the WINTech filing, however, the SRO at section 15.321 (c) specifies that devices must monitor only their transmit window to assess the channel conditions. The WINTech filing went on to describe two other acceptable conditions for monitoring a channel for access.

In one of these cases, a device hearing itself being called on a channel was allowed to reply on that channel in spite of the fact that the monitored signal level may be above the allowed threshold as a result of the calling signals or other local conditions. This is an important capability for the isochronous devices to establish two-way communications channels. These are often referred to as "duplex" connections.

In the other case, devices which were blocked from monitoring during their possible future transmit intervals due to the activity of another transmitter in the same device could, under certain conditions, monitor during their receive intervals instead. This is an important capability for isochronous devices which may utilize multiple carriers in order to provide an increased range of services and traffic capabilities from a single device or a shared antenna structure.

Neither of these two important practical conditions was allowed for in the rules in the SRO and their reinstatement has been requested by a number of petitioners. The proposed new wording for the "duplex" condition was suggested by the WINTech filing and this has been supported by a number of petitioners including Northern Telecom. New wording for the multi-carrier condition was proposed in the Northern Telecom petition and this has been opposed by a number of commentors. Some of these comments are particularly sensational in their remarks[1].

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[1] See for example :
Spectralink P4 "Inherently undermines the LBT concept", begining of a slippery slope".

Much of this opposition stems from a misunderstanding of the reliability of the LBT mechanism and the conditions under which the multi-carrier access was allowed. The LBT, when confined to the transmit interval, is not a guarantee of non interference between systems. Interference will occur between systems in spite of the LBT mechanism. The conditions under which the multi-carrier access are to be allowed will not increase the chances of interference. The following diagrams and discussion will illustrate the concepts and limitations of the LBT mechanism in more detail.

Example of Timing Interactions

The figure 1, shown below, illustrates the time windows for three possible isochronous systems (devices) operating in the shared spectrum. Many possible arrangements can be used and these are three simple arrangements to illustrate the fundamental concepts and limitations of LBT. All three systems utilize Time Division Duplex with equal time intervals assigned for each direction of transmission. System A uses a 2 millisecond frame interval with a single (duplex) time slot per frame. The frame period is constrained by the rule in the SRO 15.321 (e) to be 10 milliseconds/ X where X is an integer. Systems B and C utilize a 10 millisecond frame period with 12 (duplex) time slots per frame. In system B the transmit intervals are grouped together in the first 5 milliseconds of the frame and are followed by the 12 receive intervals. In system C, the time intervals (slots) alternate between transmit and receive. In the illustration, the transmit intervals are shown shaded.

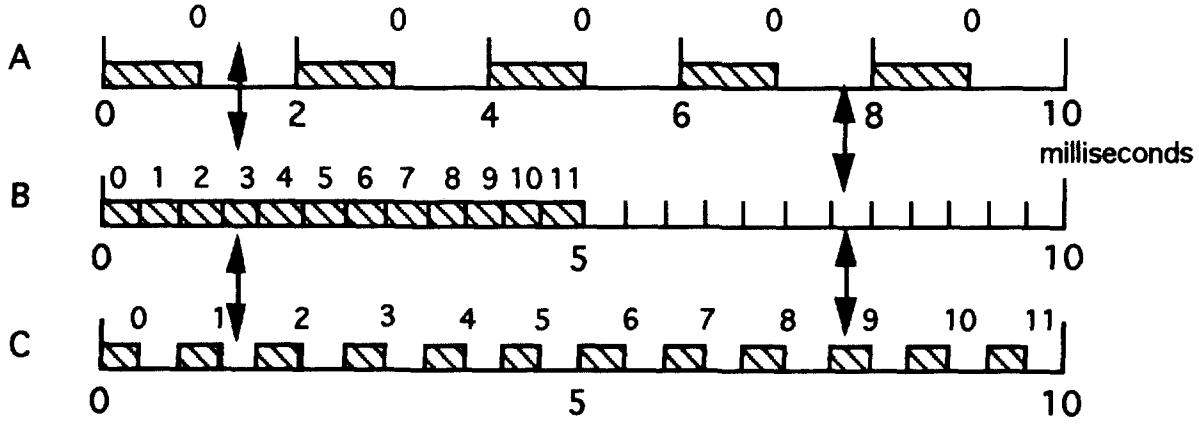

Figure 1 Transmit/Receive Timing Example

It can be seen from the diagram, for example, that system B, in monitoring the transmit interval for its time slot 3, will be monitoring during the receive interval of system A and system C. If the monitor detects a clear channel, then the system B transmissions will likely interfere with either system A or C. When monitoring other transmit time slots, system B sometimes will detect one or the other of systems A or C, but there is no assurance that an apparently free channel is not being used by another system. Similarly system C, in monitoring its transmit interval for time slot 9 will be monitoring during the receive interval for systems A and B. If the monitor detects a clear channel, then the system B transmissions will interfere with either system A or B. Whether the monitoring system detects a clear channel in these cases will depend on the particular power levels, bandwidths, relative locations and propagation between the monitoring and transmitting devices. Typically at the edges of the coverage zones of two systems, the monitoring base station will be far away from the neighboring base-station, but closer to the portables operating between them. Thus the receive interval will appear to be free when monitored at the base station even though the channel is in use by the neighboring system. As this example shows, monitoring is not a guarantee of non-interference to other dissimilar nearby systems. It is not even a guarantee of non-interference to a similar neighboring system unless the devices are synchronized in time so that the transmit intervals consistently coincide.

The probability of properly detecting the transmissions of other systems depends on the likelihood of the monitoring intervals overlapping the other system's transmissions. Given a half and half division of transmit and receive intervals, there is better than a 50% chance of detecting another equivalent transmission by monitoring. The probability will be somewhat larger than this in practice as a result of SRO rule 15.321 (c)(7). This requires that a signal be detected if there is an overlap as short as 50 microseconds. Thus the activity on the channel will be detected as long as there is an overlap between the monitoring interval and the transmission intervals of the other device.

The important point to understand is that the probability of the monitoring interval detecting the usage of the channel by another system depends only on the chance of overlap between the monitored interval and the other system's transmissions and is independent of the relationship of the monitoring interval to the transmit or receive intervals for the device.

An examination of figure 1 shows that system B would be successful in detecting the activity of System A if it did its monitoring during its receive